



# Volunteer Lake Assessment Program Individual Lake Reports

## HIGHLAND LAKE, ANDOVER, NH

### MORPHOMETRIC DATA

Watershed Area (Ac.):	3,264	Max. Depth (m):	13.4	Flushing Rate (yr <sup>-1</sup> )	1.5
Surface Area (Ac.):	211	Mean Depth (m):	5	P Retention Coef:	0.59
Shore Length (m):	4,700	Volume (m <sup>3</sup> ):	4,278,500	Elevation (ft):	645

### TROPHIC CLASSIFICATION

Year	Trophic class
1978	MESOTROPHIC
1994	MESOTROPHIC

### KNOWN EXOTIC SPECIES


The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

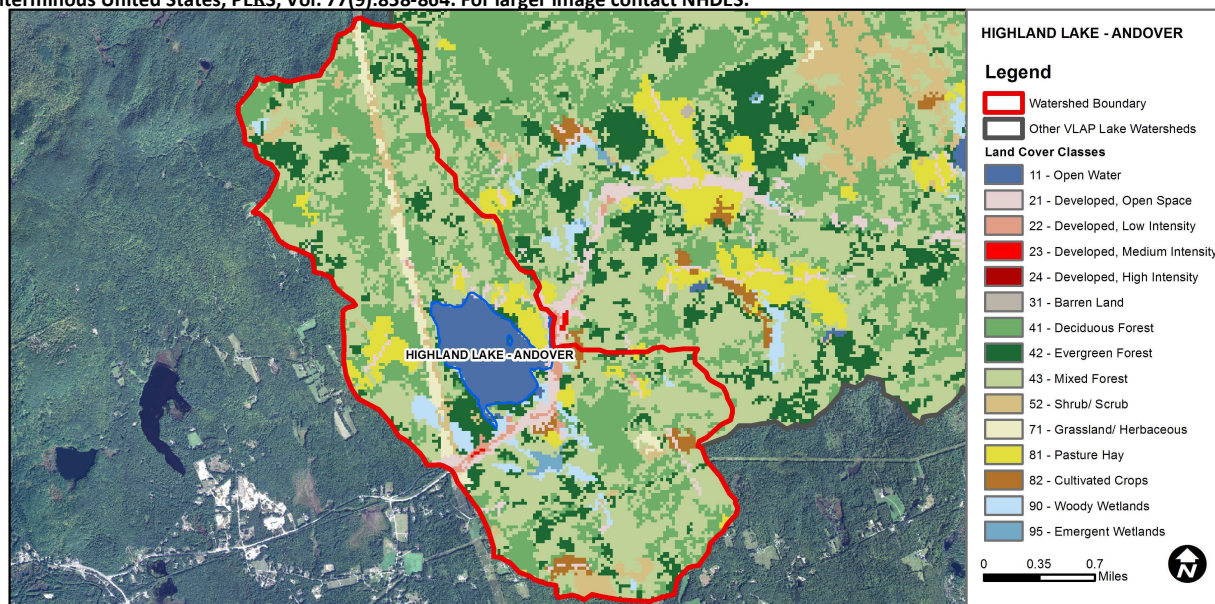
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	>=5 samples and median is < threshold but > 1/2 threshold value.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	D.O. (mg/L)	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	D.O. (% sat)	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	Chlorophyll-a	Good	>=5 samples and median is < threshold but > 1/2 threshold value.
Primary Contact Recreation	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.
	Chlorophyll-a	Very Good	At least 10 samples with 0 exceedances of criteria.

### BEACH PRIMARY CONTACT ASSESSMENT STATUS

HIGHLAND LAKE - TOWN BEACH	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.

### WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	6.48	Barren Land	0	Grassland/Herbaceous	2.66
Developed-Open Space	2.72	Deciduous Forest	25.65	Pasture Hay	4.23
Developed-Low Intensity	0.84	Evergreen Forest	9.65	Cultivated Crops	1.04
Developed-Medium Intensity	0.03	Mixed Forest	40.23	Woody Wetlands	2.57
Developed-High Intensity	0	Shrub-Scrub	3.56	Emergent Wetlands	0.4



# VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

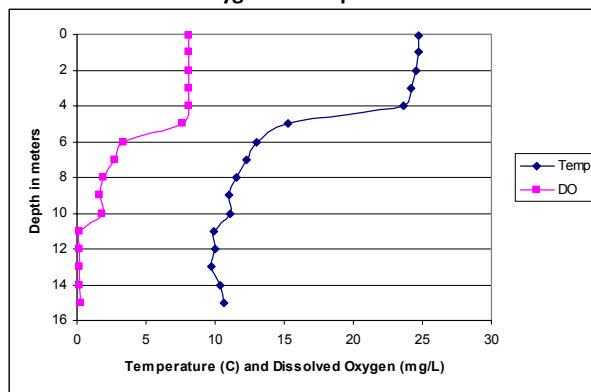
## HIGHLAND LAKE, ANDOVER, NH

### 2012 DATA SUMMARY

#### OBSERVATIONS AND RECOMMENDATIONS (Refer to Table 1 and Historical Deep Spot Data Graphic)

- ♣ **CHLOROPHYLL-A:** Chlorophyll levels were relatively low and approximately equal to the NH lake median. Historical trend analysis indicates a relatively stable chlorophyll level since monitoring began.
- ♣ **CONDUCTIVITY/CHLORIDE:** Conductivity and chloride levels were relatively low, but slightly elevated in West Inlet which is located along Rt. 11.
- ♣ **TOTAL PHOSPHORUS:** Deep spot phosphorus levels were relatively low. Historical trend analysis indicates a relatively stable epilimnetic (upper water layer) phosphorus level since monitoring began. Phosphorus levels in West Inlet were slightly elevated in July and August after significant rain events flushed the wetland system.
- ♣ **TRANSPARENCY:** Transparency improved as the summer progressed and was higher than 2011. Historical trend analysis indicates a relatively stable transparency since monitoring began.
- ♣ **TURBIDITY:** Hypolimnetic turbidity was slightly elevated and may have been caused by bottom sediment contamination. Tributary turbidity was generally more elevated in July and August after rain events flushed stagnant waters.
- ♣ **pH:** pH levels decreased to lower than desirable at deeper depths during the summer.
- ♣ **RECOMMENDED ACTIONS:** Continue chloride monitoring to establish a baseline data set. Turbidity and phosphorus levels increased after significant rain events indicating potential non-point source pollution. Educate watershed residents on ways to reduce stormwater runoff from their properties utilizing DES' "NH Homeowner's Guide to Stormwater

#### Dissolved Oxygen & Temperature Profile



Station Name	Alk.	Chlor-a	Chloride	Cond.	Total P	Trans.		Turb.	pH
	mg/l	ug/l	mg/l	uS/cm	ug/l	m		ntu	
						NVS	VS		
Epilimnion	4.9	4.6	3.37	39.1	7	4.96	5.90	0.90	6.88
Metalimnion				39.3	10			1.38	6.56
Hypolimnion				47.5	13			3.05	6.32
Lower Maple St Brook				37.8	12			1.82	6.88
Outlet				39.5	16			2.07	6.68
Tilton Brook				28.4	11			1.21	6.77
West Inlet			6.1	66.0	19			1.89	6.44

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.

**Alkalinity:** 4.9 mg/L  
**Chlorophyll-a:** 4.58 mg/m<sup>3</sup>  
**Conductivity:** 40.0 uS/cm  
**Chloride:** 4 mg/L  
**Total Phosphorus:** 12 ug/L  
**Transparency:** 3.2 m  
**pH:** 6.6

**NH Water Quality Standards:** Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

**Chloride:** < 230 mg/L (chronic)  
**E. coli:** > 88 cts/100 mL – public beach  
**E. coli:** > 406 cts/100 mL – surface waters  
**Turbidity:** > 10 NTU above natural level  
**pH:** 6.5-8.0 (unless naturally occurring)

#### HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation
Chlorophyll-a	Stable	Data not significantly increasing or decreasing.
Transparency	Stable	Data not significantly increasing or decreasing.
Phosphorus (epilimnion)	Stable	Data not significantly increasing or decreasing.

This report was generated by the NH DES Volunteer Lake Assessment Program (VLAP). For more information contact:  
 Sara Steiner  
 PO Box 95  
 Concord, NH 03302-0095  
 (603) 271-2658  
 sara.steiner@des.nh.gov



#### Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data

